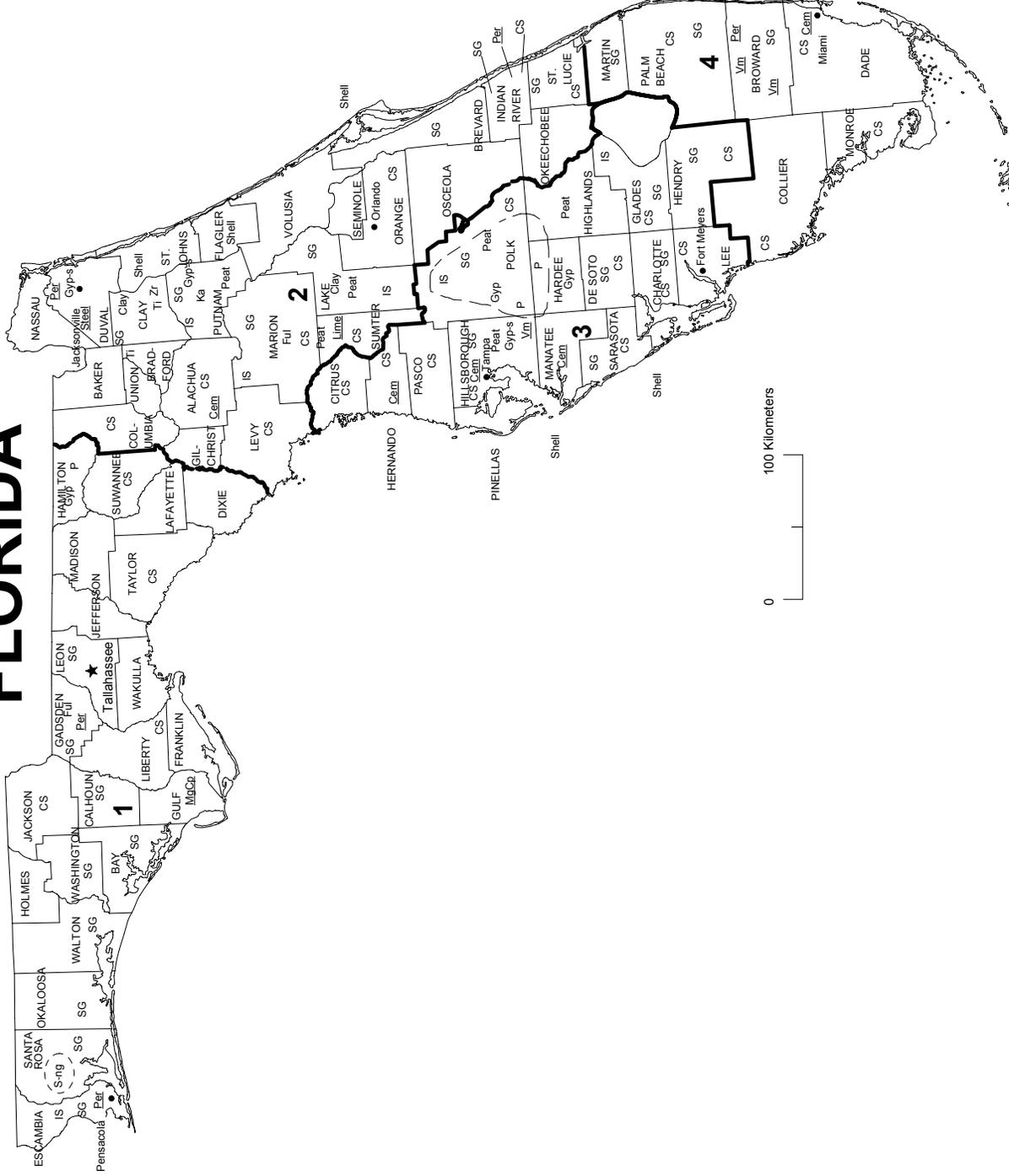


FLORIDA



LEGEND

- County boundary
- ★ Capital
- City
- 1 — Crushed stone/sand and gravel districts

MINERAL SYMBOLS (Major producing areas)

- Cem Cement plant
- Clay Common clay
- CS Crushed stone
- Ful Fuller's earth
- Gyp Gypsum
- Gyp-s Synthetic gypsum
- IS Industrial sand
- Ka Kaolin
- Lime Lime plant
- MgCp Magnesium compound plant
- P Phosphate rock
- Peat Peat
- Perf Perfitte plant
- S-ng Sulfur (natural gas)
- SG Construction sand and gravel
- Shell Shell
- Steel Steel plant
- Ti Titanium minerals
- Vm Vermiculite plant
- Zr Zirconium
- (---) Concentration of mineral operations

THE MINERAL INDUSTRY OF FLORIDA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Florida Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value¹ of nonfuel mineral production for Florida was about \$1.75 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was less than a 4% decrease from that of 2000² and followed a 9.9% decrease in 2000 from that of 1999. In 2001, for the third time in the past 4 years, Florida ranked 5th (4th in 1999) among the 50 States in total nonfuel mineral production value, of which the State accounted for almost 4.5% of the U.S. total.

Florida continued to be the Nation's leading phosphate rock-mining State in 2001, producing more than five times as much as the next highest producing State. Phosphate rock is produced in only four States. In terms of value, phosphate rock, crushed stone, cement (portland and masonry), and construction sand and gravel continued to be the most important raw nonfuel mineral commodities produced in Florida. The dollar value of these four mineral commodities when added together with that of the titanium concentrates of ilmenite and rutile represented about 94% of the State's total nonfuel mineral value. In 2001, a significant decrease in the value of phosphate rock accounted for most of the State's decrease in value. This was countered in part by increases that occurred in cement, zirconium concentrates, construction sand and gravel, magnesium compounds, and titanium concentrates (table 1).

In 2000, significant increases occurred in portland and masonry cement, up a combined \$39 million, and in crushed stone, up \$29 million. These increases were further bolstered by increases, ranging from about \$4 million to slightly less than \$1 million, in the values of magnesium compounds, zirconium concentrates, titanium concentrates (ilmenite and rutile combined), fuller's earth, and staurolite. But these were not enough to offset a more than \$250 million decrease in the value of phosphate rock. Producers of fertilizer in Florida and North Carolina were affected by lower export sales and prices,

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2001 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

which resulted from the opening of new phosphoric acid and diammonium phosphate (DAP) plants in Asia. The weak market conditions led to reduced production from phosphate rock mines and phosphoric acid plants in 2001. One mine in Florida closed permanently in August 2000 owing to market conditions; the company began using phosphate rock imported from Morocco at its fertilizer plant. Since mid-1999, four mines have closed in Florida as part of corporate restructuring programs and depletion of reserves. Overall, production in the Florida-North Carolina region during 2001 was 77% of rated annual capacity. In addition, construction sand and gravel was down about \$7 million (table 1).

Based upon USGS estimates of production in the 50 States in 2001, Florida continued to be the only State to produce rutile concentrates and staurolite; first in peat and first of two States producing ilmenite concentrates and zirconium concentrates; third in crushed stone; fifth in fuller's earth; and seventh in portland cement. The State decreased to second from first in masonry cement and to third from second in magnesium compounds. Additionally, Florida produced significant quantities of construction and industrial sand and gravel.

The Florida Geological Survey³ provided the following narrative information. The Mine Safety and Health Administration reported in 2001 that there were 6,784 persons employed in Florida's surface mining operations. This number does not take into account contractors that may be working for some operators. The limestone industry employed more than 2,665, and the phosphate industry was second with 2,055 workers. The remainder of the workforce was from sand and gravel companies, cement operations, the heavy-mineral sands industry, and clay mines operations.

Florida producers supplied approximately one-quarter of the world's phosphate needs and three-quarters of U.S. domestic needs. Nearly all of the rock that was mined in Florida, which was about 29 million metric tons (Mt) in 2000 (down slightly from 30 Mt in 1999). About 95% was used to manufacture fertilizer, and the remaining 5% was used in animal feed supplements, vitamins, soft drinks, and toothpaste.

Mulberry Corp., owner of the Piney Point Phosphate plant, went bankrupt in 2001. While it filed for Chapter 11 bankruptcy, the U.S. Environmental Protection Agency (EPA) as well as the State of Florida Department of Environmental Protection (DEP) assumed control Mulberry and the Piney Point plant. The Florida DEP paid more than \$400,000 per month to maintain the plant and keep highly acidic wastewater from seeping into Tampa Bay. The State of Florida was prepared to spend tens of millions of dollars to seal Piney Point's mountain range of phosphogypsum stacks, which contain the highly acidic

³Steven Spencer, Coastal/Economic Geologist, authored the text submitted by the Florida Geological Survey.

water, and shut the plant down completely. Phosphogypsum is a radioactive waste of phosphate processing that the EPA requires to be stored indefinitely on site in huge mounds. Pumps keep the phosphogypsum circulating within the mounds to prevent leakage into the ground water (Unger, 2001).

Phosphate companies actively mining in the State included Cargill Fertilizer, Inc., CF Industries, Inc., IMC Phosphates MP Inc., and PCS-Phosphate Co., Inc. IMC continued the process of obtaining permits to open various sites including Horse Creek in Manatee County and at Ona in Hardee County. PCS Phosphate laid off several employees due to the closure of a DAP plant in Hamilton County that was caused by market conditions in 2001. In 2001, IMC closed all four of its mines for the entire months of July and December to reduce inventories of phosphate rock that had accumulated from the closure of its phosphoric acid plants in Louisiana and lower production rates at its Florida facilities.

Most of the stone that was mined in Florida was used for road base material. Other uses included concrete and asphalt aggregate, cement manufacturing, fertilizer, soil conditioning, and rip rap.

During 2001, the State of Florida approved the purchase of the 47-hectare (ha) Harmon Brothers Rock Co. mine located near Copeland, FL. The State also agreed to purchase the Kirby Mine located about 50 kilometers north of Gainesville, FL, near the Ichetucknee River. In the case of the latter, it was the State's intent is to protect the Ichetucknee River from potential pollution.

Bergeron Sand, Rock and Aggregate Inc. sold its interest in the Mazak Limestone Mine in Sumter County to Bedrock Resources in 2001.

The Florida DEP issued permits for 10 mines in the Miami-Dade Lake Belt Area. The 10-year permits allow companies to dredge or fill about 2,200 ha of wetlands. Monies from a State-imposed fee on each ton of mined material will be used to acquire wetlands and conduct wetland enhancement and create recreation areas.

Environmental resource permits (ERPs) were issued to 10 of the 11 mines in the Miami-Dade Lake Belt Area. (Three permits were issued in 2001, and the other seven permits were issued in early 2002.) The permits for these mines, which are near a public well, will be subject to review in 3 years. All of the permits will be subject to review and renewal in 10 years. The

Army Corps of Engineers announced its intention to issue the 10 Federal permits, but local approvals were still going to be required.

Babcock Florida Co. received an ERP permit in February, 2002, to double the size of their mine in Charlotte County to 773 ha.

Limestone of high purity can undergo calcination (heating) and, together with other ingredients, be used to manufacture portland and masonry cement. Florida was a major producer and consumer of these two types of cement during year 2001. Work began on the new Suwannee American Inc. cement plant in Branford, FL, in 2001.

Florida produced both construction and industrial grade quartz sand. Sand was mined at many localities throughout the State. Quartz gravel only came from certain areas along the Trail Ridge region of the peninsula or from northwest Florida.

Fuller's earth, common clay, and kaolin were mined in few locations in Florida. Fuller's earth, typically used as an absorbent material, was mined in Gadsden and Marion Counties; kaolin, often used in the manufacture of paper and refractories, was mined in Putnam County. Common clay was mined in small quantities from various locations throughout the State and was often used in the manufacture of brick, cement, and lightweight aggregate.

Two of the five companies that mine heavy minerals in the United States were located in Florida. E.I. du Pont de Nemours and Company, Inc., and Iluka Resources, Inc. operated mines in northeast Florida in Clay, Baker, and Putnam Counties. A variety of minerals were located in the Florida heavy-mineral sand deposits including ilmenite, rutile, zircon, and leucosene. Ilmenite and rutile were primary ingredients in the manufacture of titanium dioxide pigments. These pigments were used in the manufacture of paint, plastics, paper, and varnish and lacquers. Iluka Resources put the local government approval process on indefinite hold for its proposed Yulee heavy-minerals mine. Iluka planned to proceed with the expansion in 2002.

A bill was proposed to impose a bond on phosphogypsum stacks. The bond money would be used for stack closure in the event the company failed to perform their obligation.

Reference Cited

Unger, H.M., 2001, Piney Point nears closure by DEP: Sarasota [Florida] Herald-Tribune, March 28, p. A1.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN FLORIDA 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	494	50,900 e/	546	64,900 e/	510 e/	61,200 e/
Portland	3,500	260,000 e/	3,750	285,000 e/	4,010 e/	305,000 e/
Clays, kaolin	35	3,830	33	3,420	34	3,580
Gemstones	NA	1	NA	1	NA	1
Peat	408	8,180	416	8,640	516	9,490
Sand and gravel:						
Construction	27,200	114,000	24,500	107,000	24,600	110,000
Industrial	509	6,370	510	6,320	495	6,300
Stone, crushed	91,700	466,000	93,000	495,000	90,000	494,000
Combined values of clays (common, fuller's earth), magnesium compounds, phosphate rock, staurolite, titanium concentrates, zirconium concentrates	XX	1,110,000	XX	848,000	XX	760,000
Total	XX	2,020,000	XX	1,820,000	XX	1,750,000

e/ Estimated. p/ Preliminary. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
FLORIDA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of Quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	95 r/	87,900 r/	\$442,000 r/	\$5.03	85	89,200	\$472,000	\$5.29
Dolomite	5	W	W	W	5	W	W	W
Granite	1	W	W	W	--	--	--	--
Shell	6 r/	1,480 r/	6,360 r/	4.31 r/	5	W	W	W
Total or average	XX	91,700	466,000	5.08	XX	93,000	495,000	5.33

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	228	\$2,090	\$9.18
Filter stone	101	673	6.66
Other coarse aggregate	98	483	4.93
Total or average	427	3,250	7.61
Coarse aggregate, graded:			
Concrete aggregate, coarse	13,200	90,200	6.85
Bituminous aggregate, coarse	6,870	49,400	7.18
Railroad ballast	W	W	5.34
Other graded coarse aggregate	9,210	60,500	6.56
Total or average	29,200	200,000	6.84
Fine aggregate (-3/8 inch):			
Stone sand, concrete	4,200	24,600	5.85
Stone sand, bituminous mix or seal	3,000	19,300	6.43
Screening, undesignated	2,110	11,800	5.61
Other fine aggregate	8,980	42,000	4.67
Total or average	18,300	97,600	5.34
Coarse and fine aggregates:			
Graded road base or subbase	12,500	51,900	4.16
Crusher run or fill or waste	5,690	22,800	4.00
Other coarse and fine aggregates	2,600	13,300	5.12
Total or average	20,800	88,000	4.24
Other construction materials	189	658	3.48
Agricultural limestone	(3/)	(3/)	5.95
Chemical and metallurgical, cement manufacture	(3/)	(3/)	3.58
Special, other fillers or extenders	(3/)	(3/)	5.79
Other miscellaneous uses and specified uses not listed	(3/)	(3/)	5.00
Unspecified: 4/			
Reported	9,900	44,300	4.48
Estimated	6,900	32,000	4.66
Total or average	16,800	76,500	4.55
Grand total or average	93,000	495,000	5.33

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, limestone, limestone-dolomite, and shell.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	64	403	303	1,940
Coarse aggregate, graded 3/	W	W	W	W	8,060	69,400	20,400	122,000
Fine aggregate (-3/8 inch) 4/	W	W	W	W	4,590	28,600	13,400	66,700
Coarse and fine aggregate 5/	493	3,520	5,250	21,000	3,290	14,400	11,700	49,100
Other construction materials	--	--	--	--	--	--	189	658
Agricultural 6/	W	W	W	W	W	W	--	--
Chemical and metallurgical 7/	--	--	--	--	W	W	W	W
Special 8/	--	--	--	--	W	W	--	--
Other miscellaneous uses and specified uses not listed	--	--	W	W	--	--	W	W
Unspecified: 9/								
Reported	854	4,000	4,600	19,500	231	1,080	4,220	19,800
Estimated	1,500	7,200	2,500	12,000	2,200	10,000	630	2,900
Total	3,340	20,700	13,300	59,500	23,000	143,000	53,300	272,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, and other coarse and fine aggregates.

6/ Includes agricultural limestone.

7/ Includes cement manufacture.

8/ Includes other fillers or extenders.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity	Value	Unit
	(thousand metric tons)	(thousands)	value
Concrete aggregate (including concrete sand)	10,500	\$52,500	\$4.97
Plaster and gunite sands	896	4,290	4.79
Concrete products (blocks, bricks, pipe, decorative, etc.)	1,070	5,020	4.67
Asphaltic concrete aggregates and other bituminous mixtures	132	640	4.85
Road base and coverings 2/	624	2,620	4.20
Fill	1,830	4,470	2.44
Other miscellaneous uses 3/	1,300	7,910	6.08
Unspecified: 4/			
Reported	2,450	10,800	4.43
Estimated	5,700	20,000	3.44
Total or average	24,500	107,000	4.39

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (lime).

3/ Includes filtration.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
 FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Districts 3 and 4	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	W	W	W	W	5,650	25,700
Asphaltic concrete aggregates and road base materials 3/	W	W	W	W	635	2,590
Fill	216	505	188	835	1,430	3,130
Other miscellaneous uses 4/	950	3,880	6,310	34,600	1,030	6,000
Unspecified: 5/						
Reported	407	2,970	1,270	5,190	767	2,670
Estimated	1,600	5,600	2,400	8,500	1,700	5,400
Total	3,180	13,000	10,100	49,100	11,200	45,400

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (lime).

4/ Includes filtration.

5/ Reported and estimated production without a breakdown by end use.